



# NATIONAL INSTITUTE OF TECHNOLOGY, DURGAPUR

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**BID REFERENCE:** NITD/CHEMICAL/DST-FIST/2016-17/03/2<sup>nd</sup> call

**Date:** 14.03.2017

To

\_\_\_\_\_  
\_\_\_\_\_

Dear Sir,

**SUB: Invitation for quotations for supply and installation of Atomic Absorption Spectroscopy with Graphite furnace under “DST-FIST Grant”**

1. You are invited to submit your most competitive quotation for the item as per technical specification given in **Annexure-I**. Superscribe the cover envelope as “**DST-FIST Chemical – AAS-GF**”. Price bid form as per Annexure-II must be filled with complete numerical values. Please note that each item will include sub-items.
2. **Bid Price (Annexure-II)**
  - a) The contract shall be for the full quantity as described above. Corrections, if any, shall be made by crossing out, initialing, dating and re-writing.
  - b) All duties, taxes and other levies payable by the contractor under the contract shall be included in the total price **F.O.R. Dept. of Chemical Engineering, NIT Durgapur**.
  - c) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
  - d) The bid price may be quoted in **Indian Rupees (F.O.R. Dept. of Chemical Engineering, NIT Durgapur)**.
3. Each bidder shall submit only one quotation for each item. Manufacturer/authorized dealers of reputed brands of high technical quality with adequate after-sales support facilities are eligible to apply. The bidder must have supplied similar good to reputed organizations to their full satisfaction and furnish a list of the same.
4. **The bid submitted by the bidder must comprise of the following:**

#### **Part – I (Techno-commercial Bid)**

- (a) Detailed technical specifications, conforming to the given specifications (vide Annexure – I), and literature /drawings /manuals of the goods/services to be supplied.
- (b) Authorized dealership certificate from the original manufacturer
- (c) Credentials and list of organizations where the bidder supplied similar items
- (d) Satisfaction certificates (in original letter head) of users of the same instrument working in premier national and state government academic and research institutions and universities
- (e) Warranty period (36 months comprehensive on-site). This should include service and spares. An optional 24 month comprehensive warranty must also be quoted for.
- (f) Valid sales-tax / VAT clearance certificate

#### **Part – II (Price Bid)**

- a) Price bid as per Annexure-II

#### **5. Validity of Quotation**

Quotation shall remain valid for a period not less than **60 days** after the last date of submission.

#### **6. Evaluation of Quotations**

The Purchaser will evaluate and compare the quotations determined to be substantially responsive i.e.

(a) which are properly signed and

(b) Conform to the terms and conditions, and specifications.

(c) **The quotations will be evaluated considering the cost of all mandatory / essential items including tax thereon. Price of each optional accessory needs to be quoted for separately and the additional price for extra 24 month warranty must also be indicated.**

7. **Award of contract**

The Purchaser will award the contract to the bidder whose quotation has been determined to be substantially responsive, technologically acceptable and who has offered the lowest evaluated quotation price.

7.1 Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.

7.2 The bidder whose bid is accepted will be notified of the award of contract by the Purchaser prior to expiry of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchase order.

8. Delivery shall be made at **Department of Chemical Engineering, NIT, and Durgapur.**

9. Payment shall be made immediately within 30 days after satisfactory installation, commissioning and successful demonstration of the good.

10. Comprehensive onsite warranty shall be applicable to the supplied goods for the selected period of **36 months / 60 months** from the date of installation as decided by the purchaser.

11. The Institute is **exempted from payment of custom and excise duty** on items mentioned below:

a) Scientific and technical instruments, apparatus, equipment (including computers)

b) Accessories, spare parts and consumables thereof

c) Computer software, CD-ROM, recorded magnetic tapes, microfilms, and microchips.

12. The successful bidder must submit a valid bank guarantee on any nationalized bank of **10%** of the order value towards **Performance Security** during the warranty period before the release of payment.

13. **Liquidated Damage** will be applicable at the rate of **0.5%** per week. The purchaser has the right to cancel the purchase order when LD accumulates to 10 %.

14. A bank draft of **Rs 200** towards the bid document price payable to "**FIST CHEMICAL**" at Durgapur will be enclosed with the bid by the bidder.

15. A bank draft of worth 4% of quoted price payable to "**FIST CHEMICAL**" or bank guarantee of worth 4% of quoted price in favor of NIT Durgapur, as EMD which shall remain valid for a period of 45 days beyond the final bid validity date.

16. Quotations are to be submitted in **two separate sealed covers** marked **PART-I** (Techno-commercial bid) and **PART-II** (Price bid) containing relevant documents, superscripting "**Bid No. NITD/CHEMICAL/DST-FIST/2016-17/03/2<sup>nd</sup> call**". These two sealed covers are to be placed in a separately sealed larger cover. It should be superscribed '**Not to be opened before 15.30 hours on 03.04.2017**' on these envelopes.

17. Settlement of any dispute will be made under the jurisdiction of Durgapur Court.

18. You are requested to submit your offer latest by 15.00 hours on **03.04.2017**.

19. **The purchaser will open the bids at 15.30 hours on 03.04.2017 in the HOD office of Chemical Engg. Department, NIT Durgapur.**

20. The bid document must be signed and sealed and enclosed with the bid as a token of acceptance of all terms and conditions in the bid document by the bidder.

21. The items must be delivered at the respective department within **60 days** from the date of placement of purchase order.

22. All other terms and conditions of GFR 2005 of the Government of India will be applicable.
23. **Place of Delivery: Dept. of Chemical Engineering, NIT Durgapur.**
24. **Installation / commissioning / demonstration requirement: Installation, commissioning, complete demonstration and successful running of the instrument must be demonstrated at Dept. of Chemical Engineering, NIT, Durgapur.**
25. **The technical bid and the price bid must be enclosed in separate envelopes properly sealed by the bidder, and submitted inside a cover sealed envelope, failure to do which may lead to cancellation of the bid by the tender committee.**

We look forward to receiving your quotations.

**Head, Dept. of Chemical Engineering.**

**The bid must be addressed to:**  
**Prof. Anup Kumar Sadhukhan**  
**Head, Department of Chemical Engineering**  
**NIT, Durgapur -713209, W.B.**  
**Telephones: + 91-9434788048**

**PRICE BID****Essential Items**

1 Sl. No	2 Name of the good	3 Quantity & Unit	4 Price for each unit		5 Unit Price	6 Sales tax/ VAT & other taxes payable [admissible only on col. 4(a)]	7 Total Unit Price	8 Total Unit Price (in words)
			Ex-factory/ ex-warehouse/ ex-showroom/ off the shelf (a)	Incidental Services (b)				
1	<i>Atomic Absorption Spectroscopy with Graphite furnace</i> Including mandatory items and accessories as per specification (Annexure-I)							

**Additional Prices for Optional Items (must be quoted):**

1 Sl. No	2 Name of the good	3 Quantity & Unit	4 Price for each unit		5 Unit Price	6 Sales tax/ VAT & other taxes payable [admissible only on col. 4(a)]	7 Total Unit Price	8 Total Unit Price (in words)
			Ex-factory/ ex-warehouse/ ex-showroom/ off the shelf (a)	Incidental Services (b)				
1	Comprehensive warranty for 24 months							
2	Vapor Generation Accessories							
3	Suitable Single Element coded Hollow cathode lamps or EDLs of all other elements							
4	Consumables for analysis of 500 samples in flame and							

	graphite mode each.							
5	Modifiers for elemental analysis in graphite furnace.							

## ANNEXURE-I

### TECHNICAL SPECIFICATION FOR A DOUBLE BEAM ATOMIC ABSORPTION SPECTROPHOTOMETER WITH BOTH FLAME AND ELECTROTHERMAL (GRAPHITE FURNACE) ATOMIZATION ACCESSORIES

#### General System Requirement:

The instrument should be a true Double beam AAS for elemental measurement in both absorption and emission mode. It should be equipped with high speed deuterium lamp background correction system (for Flame) and Zeeman background correction system (for Furnace) with automated wave length selection (Monochromator system) and desired adjustment of slits. The purging facility for the complete interior of the instrument will be preferred & the instrument should be capable of flame as well as graphite furnace (GF) analysis. No manual intervention for changing over from flame to furnace analysis including Auto sampler of GF is desired.

#### HARDWARE

**Optics:** Double beam optics, beams should be as narrow as possible. Optical part should be fully sealed and the mirror should be quartzcoated; should match flame and furnace.

#### MonochromatorProfile:

Czerny-Turner /Stockdale/ Littrow or equivalent optical mounting with spectral band widths: Nominal 0.2 - 1.0 nm spectral band width by automated slit selection. The wavelength selection, peaking should be fully software controlled through computer. Reciprocal Linear dispersion 2.0 nm/mm or better. It should house Holographic diffraction grating with 1800 lines/mm or more. Focal length 250 mm or more.

OR

Echelle monochromator and prism with automatic selection of wavelength and peaking with reciprocal linear dispersion 0.5 nm to 0.8 nm/mm at 200 nm or better with spectral band widths Nominal 0.1 - 1.0 nm by automated slit selection

**Detectors:** Photomultiplier detector OR segmented solid state detector covering the full range of wavelength.

**Wave Length Range:** 185-900 nm or broader.

**Lamp Turret:** Should house at least 6 nos or more nos of lamps at a time with individual power supply. Lamps should automatically be switched off at the end of the analysis. There should be provision for automatic wavelength detection and peak peaking for each element. Pre-warming facility should be present.

**Light Source:** Data coded Single element Hollow Cathode Lamps or Electrode Less discharge lamps. If the lamp sockets are specific, suitable adapters should be quoted for universal use.

**Typical performance:** >0.9A with precision of <0.5%RSD from the readings integrated over 5 seconds each or better for 5 mg/L of Cu solution.

**Background Correction:** Both by high intensity deuterium lamp working range D2 correction 185-425 nm or broader (for flame) and Zeeman background correction system (for furnace). The alignment and signal intensity modulation should be automatic.

**Efficiency:** Background signals below 2A are to be corrected for less than 2 % error & Total signal up to 3A or more

OR

2.5 A B.G. in 2 ms response

OR equivalent

**GasBox:** PC controlled gas flows should be fully programmable and auto adjusted optimally for each element and switch over from one oxidant gas to another should be automatic. Ignition of air-acetylene flame should be actuated by software. Acetylene flow should be auto enhanced when switched over from air to nitrous oxide.

**Flame Safety Features:**

Ignition of flame should be prevented by fully interlocked operation involving either of the causes: Improper burner selection, incorrect fitting of burner head, absence of proper liquid trap, loose fitting of pressure release, power failure, absence of flame shield, gas pressure too low, uncover D2 lamps. Provision should be there for separate flame ignition and emergency flame off button. The interlock status/safety features should be screen displayed.

**Burner Heads:** 10 cm long single slot/ three slot air acetylene burner and 5 cm long nitrous oxide acetylene burner made of Titanium. Burner head should be PC controlled autsetting and auto height adjustable. The burner height is to be automatically optimized.

**Spray Chamber:** Should be made up of corrosion resistant material unaffected by corrosive acids like HF/HClO<sub>4</sub> and organic solvents.

**Nebulizer:** High precision inert nebulizer, adjustable and should be made of platinum/iridium. Impact beads should be adjustable. It should be compatible to highly corrosive acid solutions, strong electrolytes, **organic solvents compatible with organic kit.**

**Graphite Furnace Atomization:**

It should be fully automated with constant temperature Zone, permanently fixed to the furnace workhead or with unique swing arm mount, involving auto alignment in optical path. Furnace workhead should be of titanium for corrosion resistant, end windows of quartz to allow high light transmission, graphite tube should be pyrolytically coated. **Working temperature range up to 2600°C or better with proper heating rate.** There should be at least the following safety interlocks involving inert gas pressure, cooling gas pressure, its temperature, presence of graphite tube and transformer temperature. **Suitable camera for capturing high definition images of events inside the graphite furnace cuvette, allowing monitoring of the sample injection and behavior is desired.**

**Auto Sampler for Graphite Furnace:** It may be a separate unit or an inbuilt unit to the GFAAS. It should be programmable; automatic sample dispenser for graphite furnace. Auto sampler capacity: 50 or more,



### Cup Volume:

- Sample cups 0.5 - 2.0 ml
- Reduced volume cups 0.1 - 1.5 ml
- Reagent cups 5 - 25 ml

Actions like matrix modification, standard additions, standards preparation, and intelligent dilution functions are to be available. Intelligent operation to improve productivity and performance with dilution to reduce the possibility of errors. Auto-sampler Loading Guide to provide optimum carousel solution placement for adjustment to meet individual's requirements.

High definition images of event inside graphite tube should be visible to the operator and a proper exhaust system is to be implanted to remove the gases from the furnace. Cooling water flowrate min.7 L/minute. Program options: Automixing of standards. Autoinjection of chemical modifiers. Provision for multiple injections.

**Software:** Windows based worksheet layout running on External PC with optical mouse or universal key board control.

**Measurement mode:** Atomic absorption and flame emission. **1 to 50 or more replicates;**  
**Read time 0.1 to 30 seconds or more,** No. of replicates: selectable, Skip to next sample if minimum signal is not noted.

**Online Cook Book:** Method window should display calibration curve, alternate wavelength and their response and other analytical recommendations.

**Sampling modes:** Both manual and auto sampler for FAAS and GFAAS respectively

**Data Handing:** All the raw data should be preserving to ensure data integrity. Absorption/emission signals should be preserved in peak height/peak area. Editing of results should be made possible using weight volume and dilution correction factors. Automatic post run modification of peak area measurement to edit the results is preferred.

**Data Import/Export options should be possible.**

**Reporting:** Report should be printable during run or post run by users selectable sequential or multi element format. Report should be customized to accommodate statistical parameters like

calibration graphs, calibration results, method parameters, mean concentration, mean absorbance, percent RSD, signal graphics etc.

**All the above items should be quoted as standard supply and not as optional items.**

#### **ACCESSORIES:**

**Data Coded** single element Hollow Cathode Lamp/EDL should have minimum life period 5000 mA/hr. Scope of elemental analysis: As, Al, Ca, K, Na, Co, Cu, Cd, Cr, Ni, Fe, Mg, Mn, Hg, Zn and Pb

**Computer and Printer:** Reputed Branded Computer with branded laser printer. The computer should possess the latest or the following minimum configuration.

Intel Core i5-5<sup>th</sup> gen, CPU @ 2.10 Gz processor, 500 GB hard disc, 4GB RAM, DVDRW , 19” LCD/TFT Color Monitor, Optical Mouse, Genuine Software: Windows 10 O.S, MS-Office and antivirus.

Branded UPS (in-line) **15 KVA** with minimum 60 min back up & isolation transformer, three phase input & single phase output ( Brand : UNILINE/EMERSON/APC/POWERONE).

The main instrument and all other accessories should be connected to the computer through communication cable via USB port of the CPU.

**Imported gas regulators for Acetylene, Nitrous Oxide and argon.**

**Air Compressor:** imported type.

**Consumables and spares including 50 nos. graphite tubes for graphite furnace along with one service manual and one operation manual.**

**Suitable Chiller (imported type)** should be quoted.

Supply and Installation of suitable fume hood (Exhaust system), good quality chemical resistant wooden table for installation of instrument and computer table should also be quoted. Supply and Installation of AC (2 ton, split) should be quoted.

Six nos. of Gas cylinders (filled) two from each category, i.e. acetylene, nitrous oxide and Argon with imported regulator, gas panel along with necessary filters must be supplied.

Superior quality (Imported type) standard solutions of 1000ppm (500 ml X 2 each) for Elements: As, Al, Ca, K, Na, Co, Cu, Cd, Cr, Ni, Fe, Mg, Mn, Hg, Zn and Pb must be supplied.

**NOTE:**

The offer needs to be accompanied with all required supporting technical literature, ISO certificate of the manufacturing works, at least details of five users with contact numbers, email ID other than performance certificate from the users. Authorization certificate of the principal companies, details of service facilities available with the contact numbers of the service persons responsible for the product are required.

**SERVICE REQUIREMENT:**

Warranty period (36 months comprehensive on-site). This should include service and spares. An optional 24 month comprehensive warranty must also be quoted for.

**ADDITIONAL REQUIREMENT:**

1. Training of two faculties at the OEM's Application Laboratory for 5 days at supplier's cost.
2. Imparting operational training to the user by the Service Engineer at the time of installation.
3. The name, make, model, partno.etc. of the imported store should be mentioned along with the price.

4. Supply at buyer's site, Installation, calibration, standardization and in-house training should be organized at supplier's cost.
5. The operational manual and service manual must be supplied in hard copy as well as in soft copy.
6. A complete list of spares and consumables that are going to be supplied as per the standard scope of supply must be provided.
7. Performance certificates from reputed institutes e.g IIT, CSIR Labs, Universities to be submitted along with the offer. Please also submit the users' list with contact details from Eastern India

**OPTIONAL REQUIREMENT:**

1 Vapor Generation Accessories: It should be modular continuous flow Vapor Generation Accessory for determination of Hg, As, Se, Sb, Te, & Bi at  $\mu\text{g/L}$  concentrations. Typical precision should be 1-2% RSD. Sample through put: 50 samples per hour or more measuring in triplicate. Spare hydride system should also be quoted.

The compatible Electro Thermal Device for flameless hydride generation must be quoted. The Electro thermal temperature control unit and work head with user replaceable cell. Detection limit for most of the VGA elements -1ppb or less.

2. Suitable Single Element coded Hollow cathode lamps or EDLs of all other elements may be quoted.

3. Consumables for analysis of 500 samples in flame and graphite mode each.

4. Modifiers for elemental analysis in graphite furnace.